



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

# Memorandum

Subject: **INFORMATION**: Engineering Brief No.67  
Light Sources Other Than Incandescent and Xenon For  
Airport and Obstruction Lighting Fixtures

Date: November 4, 2004

From: Manager, Airport Engineering Division, AAS-100

Reply to  
Attn. of:

To: All Regions  
Attn: Manager, Airports Division

Engineering Brief No. 67 provides additional requirements for light sources other than incandescent and xenon technologies subject to certification under Advisory Circular 150/5345-53, "Airport Lighting Equipment Certification Program" and other applicable documents as required. It includes the required specific test and design requirements for alternative light sources that will be used in certified airfield lighting fixtures. This Engineering Brief ensures these new lighting technologies are seamlessly integrated with existing lighting technologies on the airfield.

Airfield Lighting Equipment Manufacturers employing alternative light sources in equipment certified under FAA Advisory Circular 150/5345-53 must meet the requirements contained in each applicable AC. The third party certification activity must verify the airfield lighting manufacturers' equipment meets the design and operational provisions as dictated by changing illuminating technology.

Rick Marinelli

Attachment

# **ENGINEERING BRIEF NO. 67**

## **LIGHT SOURCES OTHER THAN INCANDESCENT AND XENON FOR AIRPORT AND OBSTRUCTION LIGHTING FIXTURES**

**November 2004**

### **I. PURPOSE**

This engineering brief provides additional requirements for “Light Sources Other Than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures” subject to certification under AC 150/5345-53, “Airport Lighting Equipment Certification Program” and/or other applicable documents.

### **II. BACKGROUND**

Manufacturers utilizing alternative light sources, such as Cold Cathode, Light Emitting Diodes (LED), fiber optics, etc. in equipment certified under the U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular No. 150/5345-53 must meet the requirements contained in each applicable equipment Advisory Circular. Additionally, the third party certification body must verify that the manufacturer's equipment meets the following design and operational provisions as dictated by changing illumination technology.

### **III. APPLICATION**

The Airport Lighting Equipment Certification Program (ALECP) outlined in AC 150/5345-53 and listed in the addendum of that document is established for airport projects receiving Federal funds under the airport grant assistance or the passenger facility charge programs.

### **IV. DESCRIPTION**

This document includes specific test and design requirements for alternative light sources used in certified equipment.

### **V. EFFECTIVE DATES**

This Engineering Brief shall become effective 6 months after signature by the Manager of the FAA Airport Engineering Division, AAS-100.

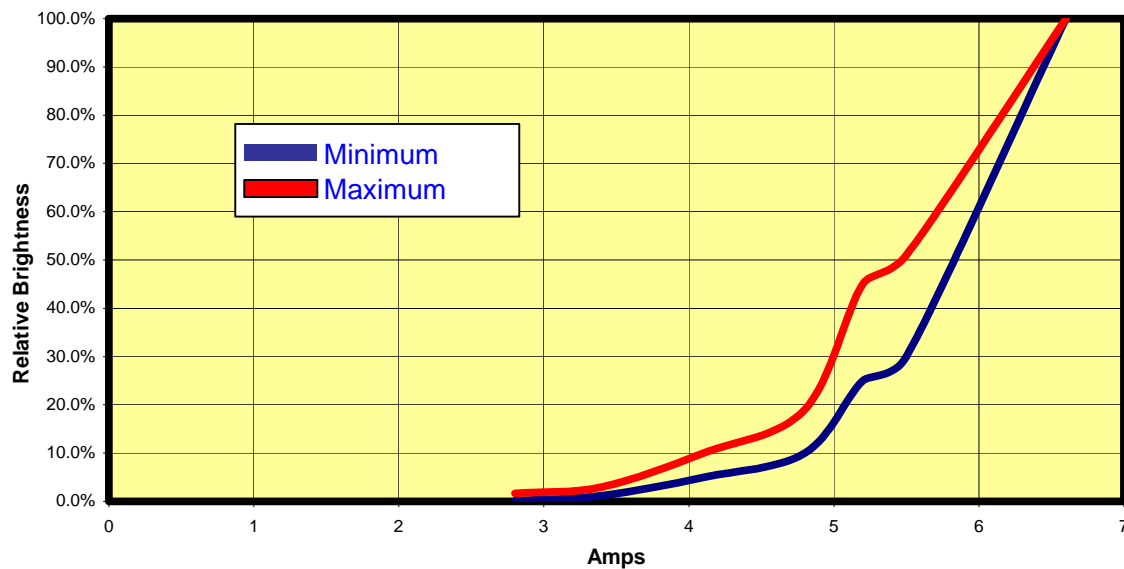
### **VI. APPLICABLE DOCUMENTS**

FAA Advisory Circulars

AC 150/5345-53     *Airport Lighting Equipment Certification Program*

**1.0 Intensity Ratios** - The intensity of a fixture with an alternative light source intended to operate on a 3 or 5 step Constant Current Regulator must vary in accordance with characteristics of an incandescent lamp as described in AC 150/5340-30, “Design and Installation Details for Airport Visual Aids”. Light output must increase with increasing lamp current steps and decrease with decreasing lamp current steps in accordance with Table 1. The tolerance for the curve as shown below will be added to AC 150/5340-30 at a later date.

The average measured intensity may not be more than three times the specified average intensity. For fixtures with a minimum but no average intensity requirement, the measured minimum may be no more than three times the specified minimum intensity. Bi-directional, split color, fixtures are exempt from this requirement if a single light source is used.



**Figure 1: Dimming Curve**

**Table 1: Dimming Tolerance**

LAMP CURRENT	% MINIMUM BRIGHTNESS	% MAXIMUM BRIGHTNESS
6.6	100.00%	n/a
5.5	30.00%	51.00%
5.2	25.00%	45.00%
4.8	10.00%	19.00%
4.1	5.00%	10.00%
3.4	1.20%	3.00%
2.8	0.15%	1.65%

**Note:** Minimums cannot be below the FAA specified brightness level at each step.

## **2.0 Additional Qualification Requirements/Testing**

2.1 Chromaticity - All fixtures must meet the chromaticity requirements of each applicable Advisory Circular for color of light emitted. Testing must be done spectroradiometrically in increments of 2nm or less. Testing must be conducted initially after a 15-minute operation in ambient conditions at +25°C.

2.2 High Temperature Test - Manufacturers must ensure that the light output of the fixture does not drop more than 30% of the photometric requirement of the applicable AC when operated in at high temperature. The photometric measurement must be done after 15 minutes operation in ambient conditions, and again after 4 hours of continuous operation at +55°C. Photometrics must be retested after 4 hours of continuous operation at +55°C.

2.3 Fixtures must be designed to operate and interface with all existing airport lighting equipment systems contained in FAA Advisory Circular 150/5345-53.

2.4 Manufacturers are required to publish the performance criteria for all light generating devices. This performance criteria is defined as worst-case wattage and VA at the input leads of the fixture. The fixture lead length shall not exceed 24 inches for this test. This information shall be listed on the manufacturer's datasheets and certified by 3<sup>rd</sup> party testing.

2.5 If multiple light devices to produce a single source are used, the design must ensure the fixture meets the light output specification while it is on, and it must discontinue operation if at least 25% of the light devices fail. Additionally, all light devices must be randomly connected to ensure that there will be no axial failures in the horizontal or vertical.

2.6 Electronic monitoring must be offered as an optional feature and may be specified by the consumer at the time of purchase. Fixtures that have the capability to be electronically monitored must provide that capability at the top two brightness steps on a 3-step constant current regulator and the top three brightness steps on a 5-step constant current regulator. The fixture in any failure condition other than photometric must have the ability to provide an open circuit (fail-open) at the secondary of the isolation transformer, or draw zero current on a constant voltage circuit. Other appropriate monitoring methods may be used if the fixtures can retrofit into existing monitoring systems.

2.7 Means must be provided on all L-861T, L-861E, L-861SE, L-862E and L-810 elevated airport or obstruction lights to indicate specified light color during daytime viewing. The minimum colored surface area must be a minimum of 2 1/2 sq. in. from any direction when using a horizontal viewing angle of 0° to +45°. The color must comply with the aviation colors as defined in the Society of Automotive Engineers (SAE) AS-25050, "Colors, Aeronautical Lights and Lighting Equipment, General Requirements for" specification corresponding to the fixture energized color and may be accomplished with appropriate means such as reflective material (not retro-reflective), painting, or

coloring of the fixture components. The upper portion of the fixture body may also be painted to achieve the desired amount of colored surface area.

2.8 Flashing lights with alternate lighting sources subject to certification under AC 150/5345-53 and/or other applicable documents must have all testing conducted in the flashing mode.

2.9 In order to verify proper color correction, photometric testing conducted on alternate light source fixtures must be done with a detector having an up to date calibration including spectral response data.

2.10 The alternate light source fixture and associated on-board circuitry must meet Federal Communications Commission (FCC) Title 47, Subpart B, Section 15, "Unintentional Radiators" regulations concerning the emission of electronic noise. Both conducted and radiated emission limits must be tested.

2.11 The interface circuitry (if any) and solid state devices shall be designed to withstand and/or include separate surge protection devices which have been tested against defined waveforms detailed in Table 4, Location Category C1 of ANSI/IEEE C62.41-1991 "Recommended Practice on Surge Voltages in Low Voltage AC Power Circuits", namely, 3000 Amps, 8/20us - short circuit current pulse and 6000 Volt, 1.2/50us - open circuit voltage pulse.

2.12 All fixtures must have an optional arctic kit or/and appropriate addressing of potential icing conditions to no less extent than present fixtures. This feature must be an optional feature and may be specified by the consumer at the time of purchase. The arctic kit must be self-activating.

2.13 An arctic kit for elevated fixtures must be offered as an optional feature and may be specified by the consumer at the time of purchase. The arctic kit must be tested as follows: With light source and arctic kit off, the light fixture must be stabilized for 4 hours at -20°C. Then, in still air and with the light source activated at the highest brightness setting, the main beam light emitting surface temperature must rise a minimum of 15°C after 30 minutes operation. For elevated fixtures, this test is run in open-air conditions.

2.14 All fixtures with a light source at or below ground level must be subjected to the in-pavement light tests described in FAA Advisory Circular 150/5345-46, "Specification for Runway and Taxiway Light Fixtures".

### **3.0 Additional Production Testing**

3.1 Burn-In Production Test - Alternative light sources must be energized for a minimum of 4 hours, at 100 percent intensity at standard ambient temperature before shipment. Any failure within an alternative light source after burn-in will be cause for rejection.